

PATENT ABSTRACTS OF JAPAN

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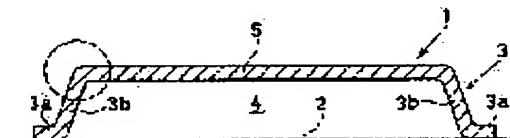
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(54) SOUND ABSORBING MATERIAL

(57)Abstract:

PURPOSE: To provide a sound absorbing material which does not provide an uncomfortable feel when touched by an operator, is hardly breakable in spite of application of load thereon, is not deteriorated by humidity, etc., has a long pot life, makes it possible to obtain a desired shape, maintains the initial shape without changing over a long period of time and is short in the working time required for molding.

CONSTITUTION: A stampable sheet formed by mixing a thermoplastic polypropylene(PP) resin and glass fibers is preheated to be expanded and to be provided with air permeability. This preheated sheet is held by two metal molds and is cooled to fix the shape to the shape of the sound absorbing material 1 consisting of leg parts 3 fixed to a wall surface 2 and a sound absorbing wall 5 forming a rear air layer 4 with the wall surface 2. The circumference is thereafter cut, by which the sound absorbing material 1 is formed. The sound absorbing material 1 allows incident of sound waves on the inside of the rear air layer 4 to attenuate approximately the max. particle velocity of the sound waves. The wavelength of the sound waves to attenuate the particle velocity changes with this sound absorbing material 1 as the incident angle changes. Since the sound absorbing material 1 is the composite of the PP resin and the glass fibers, the purposes described above are attained.



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CLAIMS

[Claim(s)]

[Claim 1] Acoustic material which is the acoustic material arranged at a wall surface, consists of composite material which has the permeability with which resin and fiber were mixed, and consists of the leg of the perimeter attached in said wall surface, and an absorption-of-sound wall which is fabricated by this leg and one and forms a back air space between said wall surfaces.

[Claim 2] It is the acoustic material characterized by having carried out hot forming of the stampable sheet which said resin is thermoplastics and mixed this thermoplastics and fiber in the acoustic material of claim 1, and being formed.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the acoustic material used for an automobile, an electrical machinery and apparatus, building services, etc.

[0002]

[Description of the Prior Art] As it was generally the mold goods by glass wool, and the mold goods by the felt as a conventional acoustic material, for example, was shown in the acoustic material 100 of drawing 3, glass wool and the felt were allotted to the interior. The acoustic material 100 of these glass wool mold goods and felt mold goods was pressurized about 1 to 3 minutes with the metal mold which applied about 200-degree C heat to the broad ingredient (glass wool or felt) extended from the original fabric (heat press forming), after that, according to the perimeter of mold goods, and the application, was performing cutting processing (a trim, pierced earring processing), and formed a part of interior.

[0003]

[Problem(s) to be Solved by the Invention] If the acoustic material 100 of glass wool mold goods is touched, the edge of glass wool will be stuck in an operator and it will give an operator displeasure. Moreover, the acoustic material 100 of glass wool mold goods had the fault into which it will be easy to break if it is weak and a load is added. Furthermore, when processing the acoustic material 100 of glass wool mold goods, it had fault with short pot life until it processes it into mold goods from a raw material. On the other hand, the acoustic material 100 of felt mold goods had the fault into which it is easy to break since rigidity is low. Moreover, when humidity joined the acoustic material 100 of felt mold goods, there was deteriorating fault. Furthermore, when processing the acoustic material 100 of felt mold goods, it had fault with short pot life until it processes it into mold goods from a raw material. Moreover, the acoustic material 100 of glass wool mold goods and felt mold goods was difficult for the volume to decrease and for the amount of [which is shown in the circle of drawing 3] edge to acquire the target configuration. It was difficult to acquire the target configuration especially with the case where the include angle for a edge is rapid, and acoustic material with a small configuration. Furthermore, as for the acoustic material 100 of glass wool mold goods and felt mold goods, for this reason, the press floor to floor time at the time of fabricating a form had the fault to which floor to floor time becomes long about 1 to 3 minutes.

[0004]

[Objects of the Invention] The purpose does not have the displeasure at the time of an operator touching, this invention was made in view of the above-mentioned situation, even if it adds a load, it is hard to break, even if influenced of humidity etc., it does not continue and deteriorate at a long period of time, and pot life is long, and it does not change [a configuration continues, and] at a long period of time, but it is in offer of the acoustic material with which floor to floor time is short with acoustic material and ends.

[0005]

[Means for Solving the Problem] The following technical means were used for the acoustic material of this invention.

(Claim 1) The acoustic material of the invention in this application is arranged at a wall surface, consists of composite material which has the permeability with which resin and fiber were mixed, is fabricated by the leg of the perimeter attached in said wall surface, and this leg and one, and consists of an absorption-of-sound wall which forms a back air space between said wall surfaces. In addition, wall surfaces may be wall surfaces of which part, such as a upper wall side, a low wall side, a side-attachment-wall side, and a slant wall side.

[0006] (Claim 2) In the acoustic material of claim 1, said resin is thermoplastics and acoustic material is

formed by hot forming by the stumpable sheet which mixed thermoplastics and fiber.

[0007]

[Function of the Invention] Since the acoustic material which consists of the above-mentioned configuration has permeability, it carries out [sound] incidence into a back air space. And the particle velocity of the acoustic wave which carries out incidence into a back air space absorbs the greatest part with composite material.

[0008]

[Effect of the Invention] Since the acoustic material of this invention consists of composite material which has the permeability with which resin and fiber were mixed, when acoustic material is touched, displeasure like glass wool is not given to an operator etc. Unlike the acoustic material by conventional glass wool and the conventional felt, the acoustic material of this invention does not have to make the interior soft, and is fabricated by high reinforcement. For this reason, even if a load is added to acoustic material, as compared with the former, it is hard to break. Since it consists of composite material with which resin and fiber were mixed, it is not influenced of humidity etc., and does not continue and deteriorate at a long period of time. It consists of composite material with which resin and fiber were mixed, and since reinforcement is high, a configuration continues and does not change at a long period of time. Since the raw material continued and is stable at the long period of time, its pot life from a raw material to mold goods is long. Since reinforcement can be fabricated highly, floor to floor time until it processes mold goods from a raw material is short, and ends.

[0009]

[Example] Next, the acoustic material of this invention is explained based on one example shown in drawing.

[Configuration of an example] Drawing 1 and drawing 2 show the example concerning claim 1 and claim 2, and drawing 1 is the outline sectional view of the acoustic material attached in each part of a car. The septum of a car bonnet, an engine room, and the interior of a room, the interior of a room and outdoor septum, etc. are arranged at a car wall surface, and acoustic material 1 absorbs an acoustic wave, and suppresses emitting the noise the interior of a room and out of a vehicle. This acoustic material 1 consists of composite material which has the permeability formed using the stumpable sheet by which glass fiber (an example of fiber) <DP N=0003> was mixed with polypropylene resin (an example of thermoplastics), and presents the abbreviation container configuration which really fabricated the absorption-of-sound wall 5 which forms the back air space 4 between the leg 3 attached in the car wall surface 2, and a wall surface 2. [0010] The permeability of each part of acoustic material 1 is the consistency of acoustic material 1 About 0.30 to 0.50 g/cm³ It was equal to the range, the permeability which was suitable for absorption of sound by making thickness into the range of about 25.0-50.0mm and an activity with a group, or car vibration, and reinforcement is secured. The leg 3 consists of spittle section 3a fixed to the car wall surface 2, and extension 3b which supports the absorption-of-sound wall 5 around the absorption-of-sound wall 5. The die length (distance of spittle section 3a and the absorption-of-sound wall 5) of this extension 3b It is prepared in the die length which keeps the optimal the die length (width of face of the back air space 4) of a wall surface 2 and the absorption-of-sound wall 5, and like this example, when using acoustic material 1 for a car, in order to prevent interference with each part of a car, and acoustic material 1, the die length of a wall surface 2 and the absorption-of-sound wall 5 is prepared in the die length which secures less than 50mm. Although the absorption-of-sound wall 5 is a flat surface fundamentally, in order to prevent interference with each part of a car, a crevice (not shown) is formed suitably.

[0011] Next, the production process of acoustic material 1 is explained briefly. First, polypropylene resin and glass fiber are mixed and the processed part of the flexible stumpable sheet which has suitable permeability is beforehand heated at about 200 degrees C. By this preheating, a stumpable sheet expands and the optimal permeability is secured. Next, the stumpable sheet by which the preheating was carried out is inserted between base metal mold with comparatively low temperature, and press metal mold, and is compressed about 30 seconds. By compression by these two metal mold, while a stumpable sheet meets the configuration between two metal mold, it is cooled and a configuration is fixed. Finally, with a trimming machine, while trimming, when insertion members, such as piping, are in the absorption-of-sound wall 5, opening of the free passage hole is carried out. Acoustic material 1 is formed of the above process.

[0012] An absorption-of-sound operation of this acoustic material 1 is explained using drawing 2. In part, by vibration of the absorption-of-sound wall 5 (or leg 3) etc., the acoustic wave A which faces to acoustic material 1 is decreased, and absorbs sound. Incidence of the remaining acoustic waves A is carried out to the back air space 4 through the absorption-of-sound wall 5 (or leg 3). And incidence is carried out to the back

air space 4, and near the max of particle velocity decreases the acoustic wave A perpendicular to a wall surface 2 by the absorption-of-sound wall 5 or the leg 3. Moreover, incidence is carried out to the back air space 4, it inclines to a wall surface 2 and near the max of particle velocity decreases the acoustic wave A (acoustic wave with wavelength longer than the acoustic wave which carried out incidence at right angles to a wall surface 2) which carried out incidence by the absorption-of-sound wall 5 or the leg 3. Thus, it can continue and absorb sound in the large wavelength range by whenever [incident angle / of an acoustic wave A].

[0013] (Effectiveness of an example) Although glass fiber is blended, since acoustic material 1 is hardened with polypropylene resin, it prevents sticking the edge of glass fiber in an operator etc. Consequently, displeasure is not given to the operator who touches acoustic material 1. Since acoustic material 1 is what has the high reinforcement which hardened the polypropylene resin with which glass fiber was mixed, even if a load is added to acoustic material 1, it cannot break easily as compared with the former.

[0014] Since acoustic material 1 consists of composite material which hardened glass fiber with polypropylene resin, it is not influenced of humidity etc., and does not continue and deteriorate at a long period of time. the composite material with which, as for acoustic material 1, glass fiber and polypropylene resin were mixed -- ** -- since it is the thing of high reinforcement, a configuration continues and does not change at a long period of time. Moreover, since acoustic material 1 is inserted and fabricated with metal mold from a front-face and rear-face side, it can make the configuration of an appearance in agreement with the target configuration. For this reason, the part of the edge shown, for example in the circle of drawing 1 can be fabricated in the target configuration. That is, it uses for what has a marginal sharp configuration, and the acoustic material 1 with which a small configuration is demanded, and is suitable.

[0015] Since a raw material is the stumpable sheet which had glass fiber and polypropylene resin mixed, it continued and is stable at the long period of time. For this reason, the pot life from a raw material to mold goods is very long as compared with the former. Although press time took about 1 to 3 minutes when it was the former, at this example, press time can be managed in about 30 seconds. For this reason, floor to floor time until it processes mold goods from a raw material is short as compared with the former, ends, and is excellent in workability.

[0016] [Modification(s)] -- although the example of the account of a top showed the example which used polypropylene resin as an example of thermoplastics, other thermoplastics, such as polyethylene, may be used for others. Moreover, although the example using glass fiber as an example of fiber was shown, other fiber, such as inorganic fibers other than glass fiber, organic fiber, such as a carbon fiber, a chemical fiber, and a natural fiber, may be used. Furthermore, although the example which used acoustic material for the car was shown, you may apply as an acoustic material used for an audio equipment, OA equipment, a household-electric-appliances device, building services, etc.

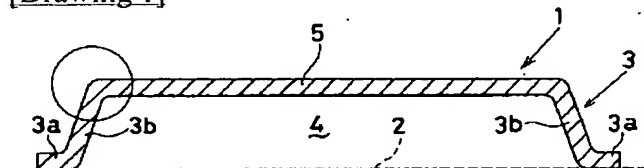
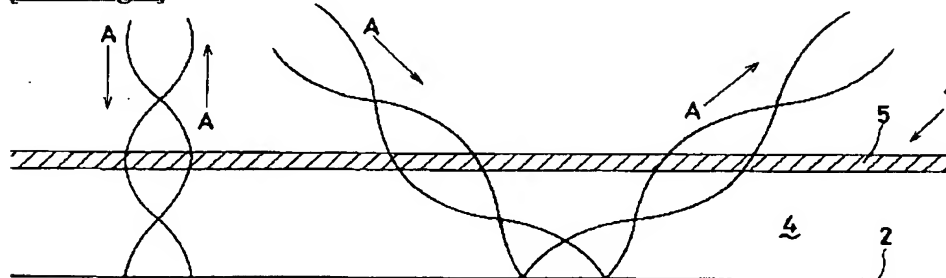
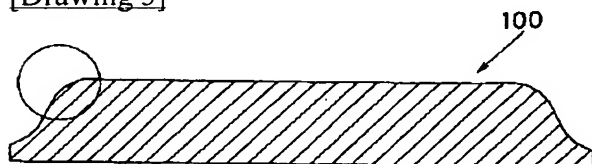
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DRAWINGS

[Drawing 1]**[Drawing 2]****[Drawing 3]**

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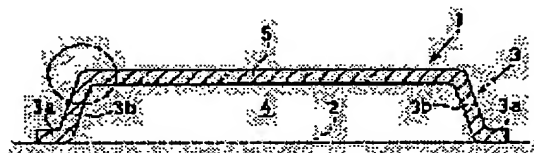
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of the rear air layer 4 to attenuate approximately the max. particle velocity of the sound waves. The wavelength of the sound waves to attenuate the particle velocity changes with this sound absorbing material 1 as the incident angle changes. Since the sound absorbing material 1 is the composite of the PP resin and the glass fibers, the purposes described above are attained.



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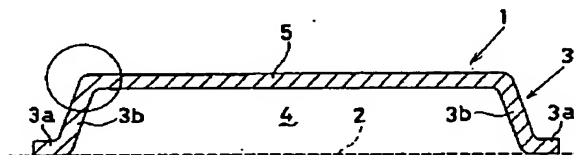
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(54) 【発明の名称】 吸音材

(57) 【要約】

【目的】 作業者が触れた際の不快感がなく、荷重を加えても折れにくく、湿度などによる劣化がなく、ポットライフが長く、目的の形状を得ることができ、形状が長期に亘って変化せず、成形に要する加工時間が短い吸音材。

【構成】 熱可塑性のポリプロピレン樹脂と、グラスファイバーとを混合してなるスタンパブルシートを予熱し、膨張させて通気性を持たせる。予熱されたシートを2つの金型で挟み、冷却して形状を、壁面2に固定される脚部3と、壁面2との間に背後空気層4を形成する吸音壁5とからなる吸音材1の形状に固定する。その後、周囲を切断して吸音材1が形成される。吸音材1は、音波を背後空気層4内に入射させ、音波の粒子速度が最大付近を減衰させる。この吸音材1は、射角度が変化することで、粒子速度を減衰させる音波の波長が変化する。ポリプロピレン樹脂とグラスファイバーとの複合体であるため、上記の目的を達成できる。



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【特許請求の範囲】

【請求項1】壁面に配置される吸音材であって、樹脂と繊維とが混合された通気性を有する複合材料よりなり、前記壁面に取り付けられる周囲の脚部と、この脚部と一体に成形され、前記壁面との間に背後空気層を形成する吸音壁とからなる吸音材。

【請求項2】請求項1の吸音材において、前記樹脂は、熱可塑性樹脂で、この熱可塑性樹脂と繊維とを混合したスタンバブルシートを加熱成形して形成されたことを特徴とする吸音材。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、自動車、電気機器、建築設備等に用いられる吸音材に関するものである。

【0002】

【従来の技術】従来の吸音材としては、一般的にグラスウールによる成形品か、フェルトによる成形品で、例えば図3の吸音材100に示すように、内部までグラスウールやフェルトが配されていた。これら、グラスウール成形品およびフェルト成形品の吸音材100は、原反から延ばされた幅広の材料（グラスウールあるいはフェルト）に、約200℃の熱を加えた金型で1～3分程加圧し（熱プレス成形）、その後、成形品の周囲や、用途に応じて内部の一部を切断加工（トリム、ピアス加工）を行い形成していた。

【0003】

【発明が解決しようとする課題】グラスウール成形品の吸音材100は、触るとグラスウールの端部が作業者に刺さり、作業者に不快感を与える。また、グラスウール成形品の吸音材100は、もろく、荷重が加わると折れやすい不具合があった。さらに、グラスウール成形品の吸音材100を加工する際、原料から成形品に加工するまでのポットライフが短い不具合を有していた。一方、フェルト成形品の吸音材100は、剛性が低いために折れやすい不具合があった。また、フェルト成形品の吸音材100に湿度が加わると、劣化する不具合があった。さらに、フェルト成形品の吸音材100を加工する際、原料から成形品に加工するまでのポットライフが短い不具合を有していた。また、グラスウール成形品およびフェルト成形品の吸音材100は、図3の円内に示す縁部分が、体積が減少し、目的とする形状を得るのが困難であった。特に、縁部分の角度が急激な場合や、形状の小さい吸音材では、目的の形状を得るのが困難であった。さらに、グラスウール成形品およびフェルト成形品の吸音材100は、形を成形する際のプレス加工時間が1～3分程かかるため、加工時間が長くなる不具合を有していた。

【0004】

【発明の目的】本発明は、上記の事情に鑑みてなされた

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もので、その目的は、作業者が触った際の不快感がなく、荷重を加えても折れにくく、湿度などの影響を受けても長期に亘って劣化せず、ポットライフが長く、形状が長期に亘って変化せず、加工時間が短くて済む吸音材の提供にある。

【0005】

【課題を解決するための手段】本発明の吸音材は、次の技術的手段を採用した。

（請求項1）本願発明の吸音材は、壁面に配置されるものであって、樹脂と繊維とが混合された通気性を有する複合材料よりなり、前記壁面に取り付けられる周囲の脚部と、この脚部と一体に成形され、前記壁面との間に背後空気層を形成する吸音壁とからなる。なお、壁面は、上壁面、下壁面、側壁面、斜壁面など、どの部位の壁面であっても良い。

【0006】（請求項2）請求項1の吸音材において、前記樹脂は、熱可塑性樹脂で、吸音材は、熱可塑性樹脂と繊維とを混合したスタンバブルシートで加熱成形によって形成される。

【0007】

【発明の作用】上記構成よりなる吸音材は、通気性を有するため、背後空気層内へ音を入射させる。そして、背後空気層内へ入射する音波の粒子速度が最大の部分を、複合材料によって吸収する。

【0008】

【発明の効果】本発明の吸音材は、樹脂と繊維とが混合された通気性を有する複合材料よりなるため、吸音材に触れた際、グラスウールのような不快感を作業者等に与えることがない。本発明の吸音材は、従来のグラスウールやフェルトによる吸音材と異なり、内部を柔らかくする必要がなく、高い強度で成形される。このため、吸音材に荷重が加えられても、従来に比較して折れにくい。樹脂と繊維とが混合された複合材料よりなるため、湿度などの影響を受けず、長期に亘って劣化しない。樹脂と繊維とが混合された複合材料よりなり、且つ強度が高いため、形状が長期に亘って変化しない。原料は長期に亘って安定しているため、原料から成形品までのポットライフが長い。強度を高く成形できるため、原料から成形品を加工するまでの加工時間が短くて済む。

【0009】

【実施例】次に、本発明の吸音材を、図に示す一実施例に基づき説明する。

【実施例の構成】図1および図2は請求項1および請求項2にかかる実施例を示すもので、図1は例えば車両の各部に取り付けられる吸音材の概略断面図である。吸音材1は、車両ボンネット、エンジンルームと室内との隔壁、室内と室外との隔壁など、車両壁面に配置され、音波を吸収し、騒音を室内や、車外へ放出するのを抑えるものである。この吸音材1は、ポリプロピレン樹脂（熱可塑性樹脂の一例）とグラスファイバー（繊維の一例）

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とが混合されたスタンバブルシートを用いて形成された通気性を有する複合材料よりなり、車両壁面2に取り付けられる脚部3と、壁面2との間に背後空気層4を形成する吸音壁5とを一体成形した略容器形状を呈するものである。

【0010】吸音材1の各部の通気性は、吸音材1の密度を約0.30～0.50g/cm³の範囲、厚みを約25.0～50.0mmの範囲とすることで吸音に適した通気性、および組付作業や車両振動に耐え強度を確保している。脚部3は、車両壁面2に固定されるツバ部3aと、吸音壁5の周囲で吸音壁5を支える延長部3bとからなる。この延長部3bの長さ(ツバ部3aと吸音壁5との距離)は、壁面2と吸音壁5との長さ(背後空気層4の幅)を最適に保つ長さに設けられるもので、本実施例のように、吸音材1を車両に用いる場合は、車両の各部と吸音材1との干渉を防ぐために、壁面2と吸音壁5との長さを50mm以内を確保する長さに設けられている。吸音壁5は、基本的に平面であるが、車両の各部との干渉を防ぐために、適宜、凹部(図示しない)が形成されたものである。

【0011】次に、吸音材1の製造工程を簡単に説明する。まず、ポリプロピレン樹脂とグラスファイバーとが混合され、適切な通気性を有する可撓性のスタンバブルシートの被加工部分を約200℃に予熱する。この予熱によって、スタンバブルシートが膨張し、最適な通気性を確保する。次に、予熱されたスタンバブルシートを、比較的温度の低いプレス金型とプレス金型との間に挟み、30秒ほど圧縮する。この2つの金型による圧縮で、スタンバブルシートが、2つの金型の間の形状に沿うとともに、冷却されて形状が固定される。最後に、トリミング機によって、縁取りを行うとともに、吸音壁5に配管等の挿通部材がある場合は、連通穴を開く。以上の工程によって、吸音材1が形成される。

【0012】この吸音材1の吸音作用を図2を用いて説明する。吸音材1に向かう音波Aは、一部、吸音壁5(あるいは脚部3)の振動等によって減衰され吸音される。残りの音波Aは、吸音壁5(あるいは脚部3)を通過して背後空気層4へ入射する。そして、背後空気層4へ入射し、壁面2に垂直な音波Aは、粒子速度の最大付近が、吸音壁5あるいは脚部3によって減衰される。また、背後空気層4へ入射し、壁面2に対して傾斜して入射した音波A(壁面2に垂直に入射した音波よりも波長の長い音波)も、粒子速度の最大付近が、吸音壁5あるいは脚部3によって減衰される。このように、音波Aの入射角度によって、広い波長範囲に亘って吸音することができる。

【0013】(実施例の効果)吸音材1は、グラスファ

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イバーが配合されているが、ポリプロピレン樹脂によって固められているため、グラスファイバーの端が作業員などに刺さることが防がれる。この結果、吸音材1に触れる作業員に不快感を与えない。吸音材1は、グラスファイバーが混合されたポリプロピレン樹脂を固めた高い強度を有するものであるため、吸音材1に荷重が加えられても、従来に比較して折れにくい。

【0014】吸音材1は、グラスファイバーをポリプロピレン樹脂で固めた複合材料よりなるため、湿度などの影響を受けず、長期に亘って劣化しない。吸音材1は、グラスファイバーとポリプロピレン樹脂とが混合された複合材料より高い強度のものであるため、形状が長期に亘って変化しない。また、吸音材1は、表面側と裏面側とから金型で挟まれて成形されるため、外形の形状を目的の形状と一致させることができる。このため、例えば図1の円内に示す縁の部分を、目的の形状に成形できる。つまり、縁の形状がシャープなものや、小さな形状が要求される吸音材1に用いて好適なものである。

【0015】原料はグラスファイバーとポリプロピレン樹脂とを混合されたスタンバブルシートであるため、長期に亘って安定している。このため、原料から成形品までのボットライフが従来に比較して大変長い。従来であれば、プレス時間が1～3分程かかったが、本実施例ではプレス時間が30秒程で済む。このため、原料から成形品を加工するまでの加工時間が従来に比較して短くて済み、作業性に優れる。

【0016】〔変形例〕上記の実施例では、熱可塑性樹脂の一例として、ポリプロピレン樹脂を用いた例を示したが、他にポリエチレンなど、他の熱可塑性樹脂を用いても良い。また、繊維の一例として、グラスファイバーを用いた例を示したが、グラスファイバー以外の無機繊維や、カーボンファイバー等の有機繊維、化学繊維や天然繊維など、他の繊維を用いても良い。さらに、吸音材を車両に用いた例を示したが、音響機器、OA機器、家電機器、建築設備などに用いる吸音材として適用しても良い。

【図面の簡単な説明】

【図1】吸音材の断面図である。

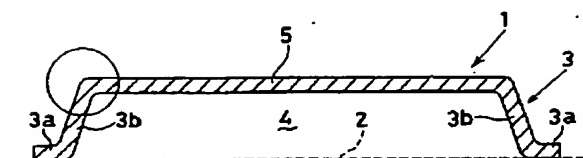
【図2】吸音材の吸音メカニズムを説明するための説明図である。

【図3】従来の吸音材の断面図である。

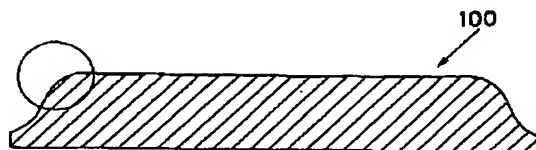
【符号の説明】

- 1 吸音材
- 2 壁面
- 3 脚部
- 4 背後空気層
- 5 吸音壁

【図1】



【図3】



【図2】

